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Exploitation Levels of the Cape Breton Snow Crab Fishery (Area 1 and 7) for 1984

by

R.J. Cormier and M. Comeau
Department of Fisheries and Oceans
Marine Biology Research Centre
Université de Moncton
Moncton, N.B. E1A 3E9

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ABSTRACT

In 1984, thirty four licences were given in area 1. This increased effort produced lower catch per unit of effort (CPUE) and a higher exploitation level (77.1%). The distribution of fishing effort changed often during the season in an attempt to maintain higher CPUE's.

In area 7, the season started three weeks late because of the presence of soft-shelled crab. Adding bad weather to this situation, hampered fishing operations which resulted in lower CPUE. It is estimated that 40.1% of the initial biomass was removed during the season.

RESUME

En 1984, trente quatre nouveaux permits de pêche ont été délivrés dans la zone 1. Cette augmentation d'effort a eu comme effet de baisser les prises par unité d'effort (PUE) et d'augmenter le niveau d'exploitation (77,1%). L'effort de pêche a souvent été redistribué durant la saison afin de maintenir un niveau acceptable de PUE.

La saison a débuté trois semaines en retard dans la zone 7 en raison de la présence de crabes à carapace molle. Ce phénomène accompagné de mauvaises conditions météorologiques, a eu un effet négatif sur la PUE. Il est estimé que 40,1% de la biomasse initial a été enlevé durant la saison de pêche.

INTRODUCTION

In 1984, new licenses were given to fishermen in area 1 (Figure 1). In order to increase the number of licenses without increasing the total allowable catch, the number of traps per fishermen was lowered to 20 from 30 and the vessel allocation of 80000 pounds was lowered to 50000 pounds. In area 7 (Figure 1), no new licenses were given. The fleet continued to fish with a trap limit of 30 and a vessel allocation of 80000 pounds. Area 7 was also closed to outside fleets allowing an analysis of the catch effort data by the Leslie method (Ricker, 1975).

The Leslie analysis (Ricker, 1975) of weekly cumulated catch and catch per unit of effort has been used with some success to estimate exploitation levels of these fisheries in the past (Elner and Robichaud, 1980; Elner and Robichaud, 1981; Bailey and Cormier, 1983; Cormier and Bailey; 1984). The stocks in area 1 and 7 are small in surface area and most of the major concentrations are considered to be exploited by the fishery.

MATERIALS AND METHODS

Weekly landings, effort and catch per unit of effort (CPUE) for area 1 and 7 were derived from fishermen's log records. Only properly filled out log records with 1 to 3 soakdays were used to calculate weekly CPUE. All log records were used to calculate weekly cumulative landings which corresponds to totals up to the middle of the week. Once compiled, these data were analysed according to the Leslie method. Exploitation levels (E) were calculated using equation (1); where C_t is the total catch for the weeks used in the analysis and B_o is the biomass at the beginning of the season estimated by the Leslie method.

$$(1) \qquad E = C_t \,/\, B_o \times 100$$

Data from area 1 for 1983 were recompiled and exploitation levels were calculated using the same approach as described above. Data for 1983 were recompiled in order to compare it with 1984.

RESULTS AND DISCUSSION

Area 1

Weekly catch, effort and CPUE for 1984 as well as CPUE for 1983 are presented in Table 1. In general, 1984 CPUE followed the same trend as in 1983. The only difference is in the duration of the fishery. In 1984, the season lasted longer and CPUE dropped a little faster because of the increased number of fishermen fishing the area. In 1984, CPUE for the overall season is estimated at 50.5 kg/trap hauled compared to 81.8 kg/trap hauled in 1983. This drop is considered to be the result of increased fishing effort.

In 1984, when using all data points in the Leslie regression (Figure 2), exploitation levels are estimated at 58.7% (33.9% - 75.6%). On the other hand, after the seventh week of the season, CPUE increased at a steady rate until the end of the season (Table 1). Analysis of fishing effort distribution suggests that most of the fishery was concentrated in the deeper channels during the first 7 weeks of the fishery (Figure 3). After this period the number of fishermen fishing the area dropped by 62% and most of the remaining fishing effort moved to the outer side of the channels (Figure 4) in an attempt to maintain a higher CPUE. It is presumed that the remaining fishermen were the ones that had less experience at fishing crab (i.e. the new licenses). Therefore, it was decided to remove these weeks from the Leslie analysis because the effort was not distributed in the same manner as the beginning of the season. Exploitation level calculated from the results of the Leslie analysis of the first seven weeks of the season (Figure 5) is estimated at 77.1% (64.2% - 84.4%). This is somewhat higher than the exploitation level of 67.2% (49.3% - 79.5%) estimated from the Leslie analysis of the 1983 data (Figure 6). On the other hand, exploitation levels of 1984 and 1983 are not comparable because the fishery was not exploiting the same surface area during those two years (Figures 3, 4 and 7).

Area 7

Weekly catch, effort and CPUE for area 7 are presented in Table 2. In 1984, 460 t was landed in area 7. In general, CPUE followed similar trends during the 1984 season as in 1983 for area 7. In 1984, the season started late in the year due to the presence of soft-shelled crab. This, accompanied with bad weather, is considered to be the reason why CPUE was lower in 1984.

Leslie analysis of area 7 is presented in Figure 8. Exploitation levels are estimated at 40.1% (31.0% - 47.9%). This is somewhat lower than the 1983 estimate of 45.7% (Cormier and Bailey, 1984) and may be explained by the shorter 1984 season.

CONCLUSION

Several conditions must be met before using the Leslie method to analyse catch data to obtain initial biomass and consequently derive exploitation levels of a given fishery (Bailey, 1983). One of these conditions dictates that the fishing effort must be distributed evenly throughout the season. Therefore, in order to compare exploitation levels from year to year, an in depth analysis of the fishing effort distribution over the fishing grounds should be conducted. Consequently, exploitation levels should be weighted in order to minimize the effect of different fishing effort distributions from year to year.

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Table 1. Area 1 catch, effort and catch per unit of effort for the year 1984 and catch per unit of effort for the year 1983.

Week	Catch (Kg)	Effort (trap haul)	C.P.U.E.(Kg/trap haul) 1984	1983
15/07-21-/7	235018	2521	93.2	98.5
22/07-28/07	138116	1709	80.8	97.6
29/07-04/08	327523	5693	57.5	79.2
05/08-11/08	197347	4726	41.7	55.7
12/08-18/08	137184	4007	34.2	44.6
19/08-25/08	69602	2055	33.9	41.5
26/08-01/09	69749	2212	35.5	32.8
02/09-08/09	67798	1586	42.8	36.3
09/09-15/09	22475	471	47.7	
16/09-22/09	34828	751	46.4	
23/09-29/09	15605	303	51.5	
Total	1315246	26034	50.5	81.8

Table 2. Area 7 catch, effort and catch per unit of effort for the year 1984 and catch per unit of effort for 1983.

Week	Catch(Kg)	Effort (trap/haul)	C.P.U.E.(Kg/trap haul) 1984	1983
12/08-18/08				41.4
19/08-25/08				35.3
26/08-01/09	149818	3576	41.9	44.8
02/09-08/09	122092	3154	38.7	49.9
09/09-15/09	62272	1835	33.9	48.5
16/09-22/09	55121	1899	29.0	41.7
23/09-29/09	40264	1290	31.2	43.6
30/09-06/10	25543	928	27.5	33.8
07/10-13/10	5312	197	27.2	35.8
14/10-20/10				34.0
Total	460422	12877	35.8	43.4

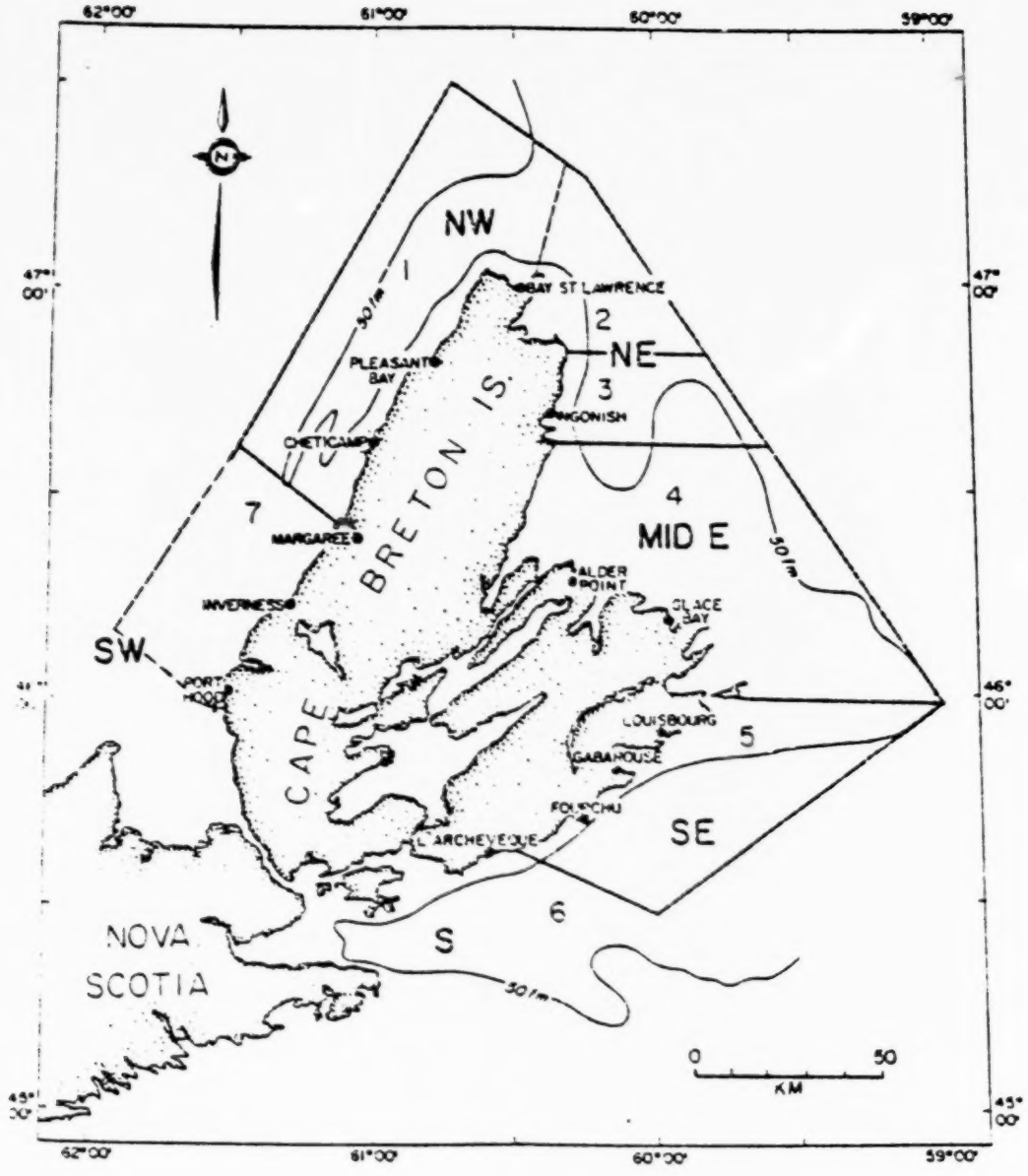

Figure 1. Cape Breton fishing area 1 and 7.

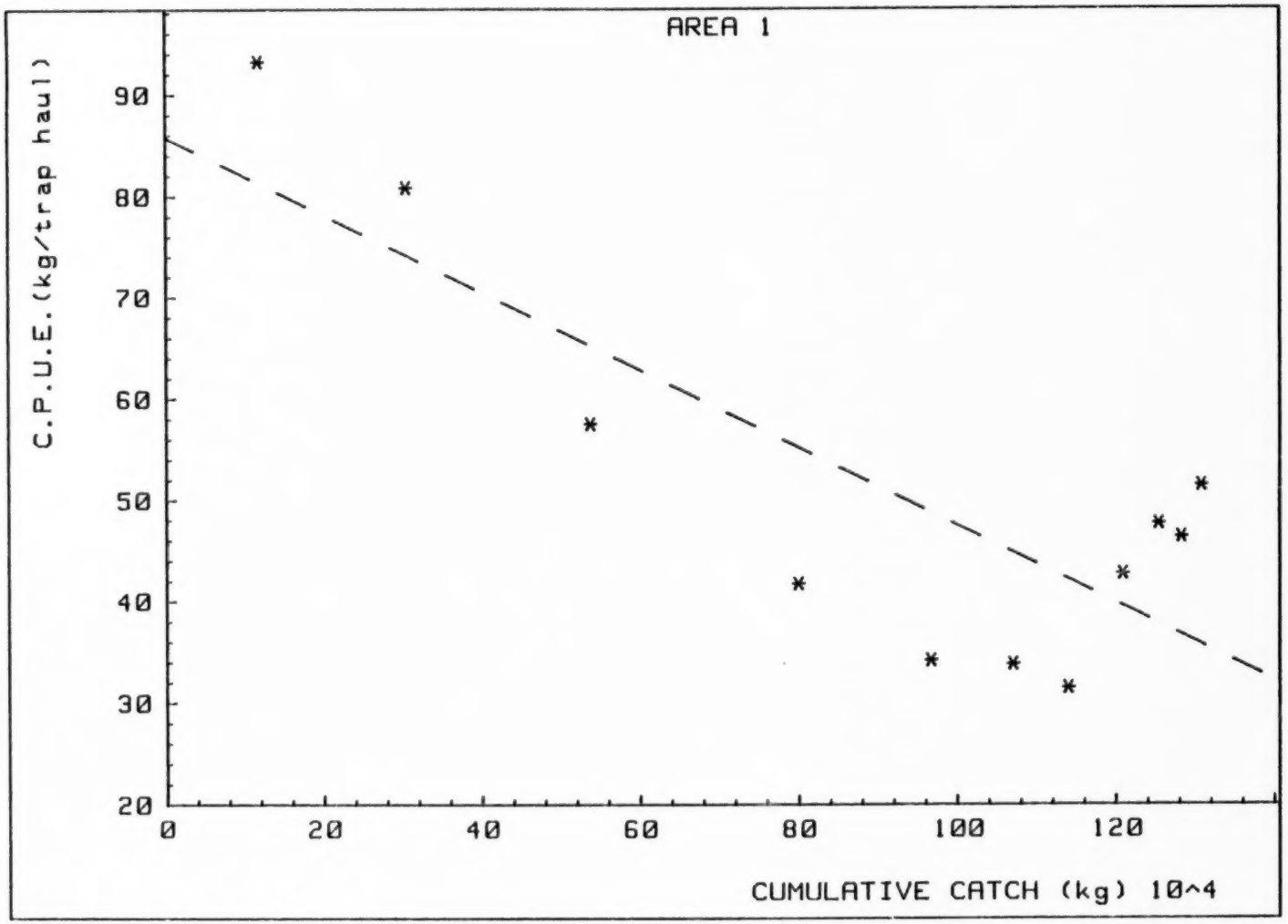

Figure 2. Leslie's analysis of catch and effort data from area 1 in 1984.

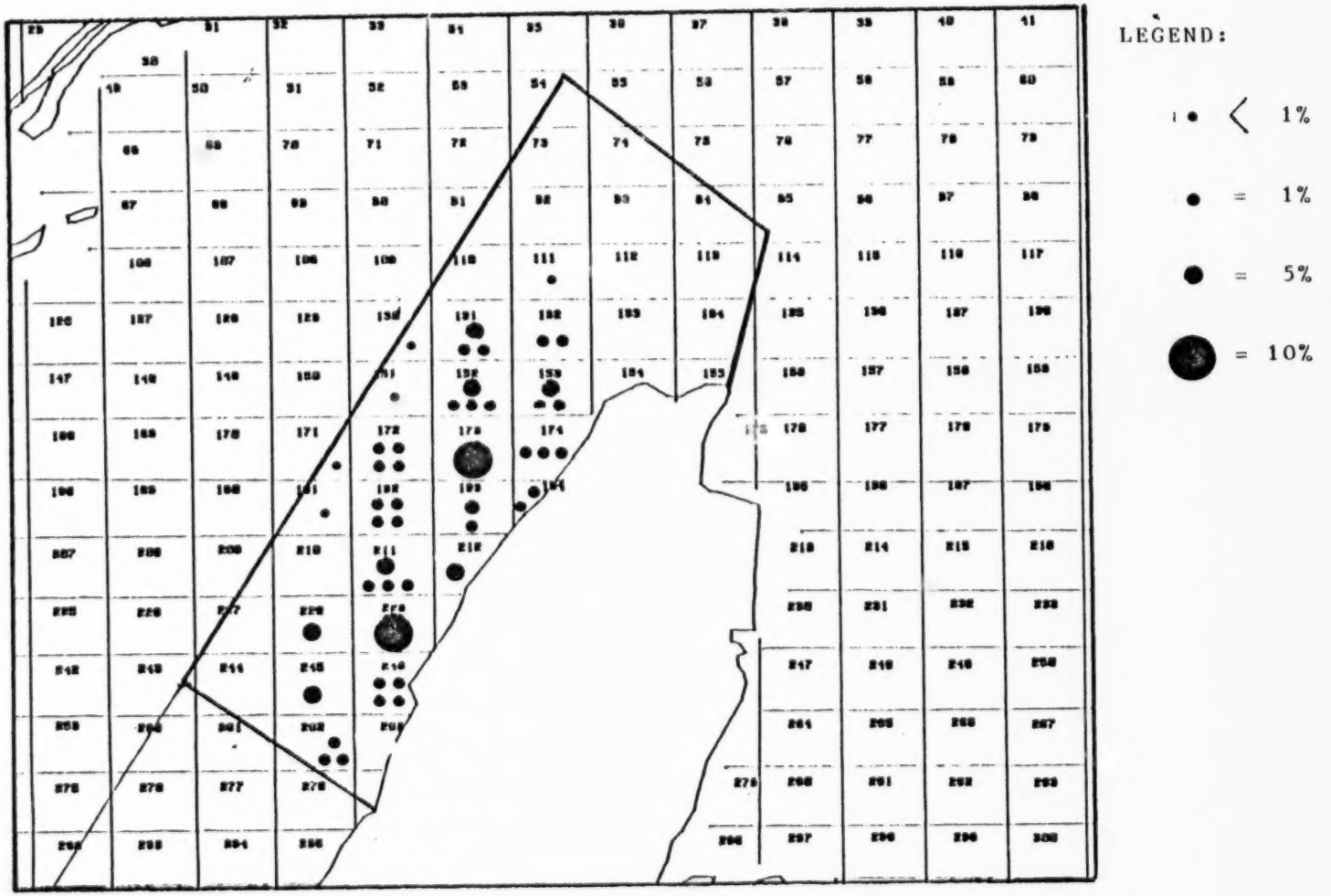

Figure 3. Distribution of fishing effort (% of trap haul) in area 1 for the first 7 weeks in 1984.

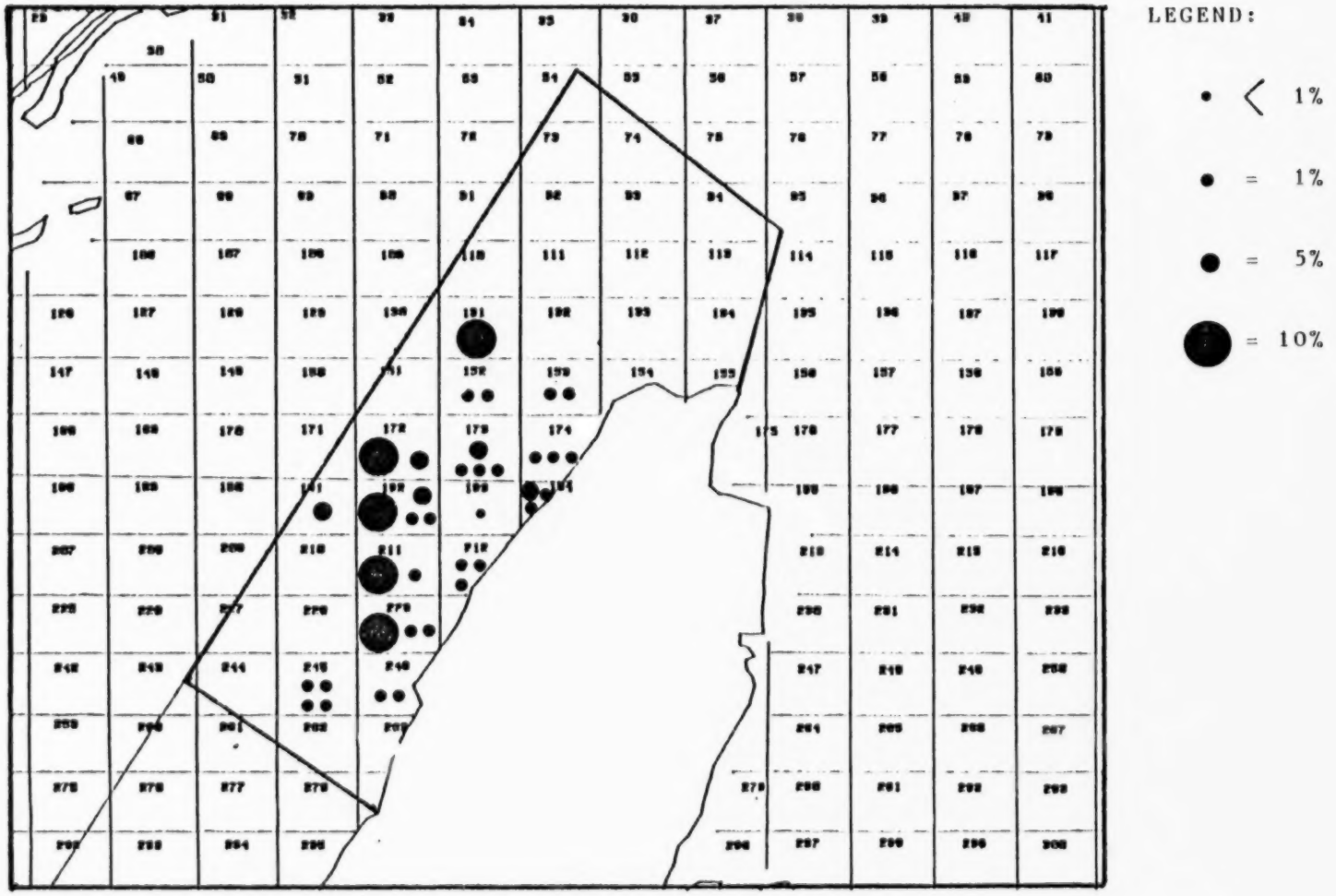

Figure 4. Distribution of fishing effort (% of trap haul) in area 1 for the last 4 weeks in 1984.

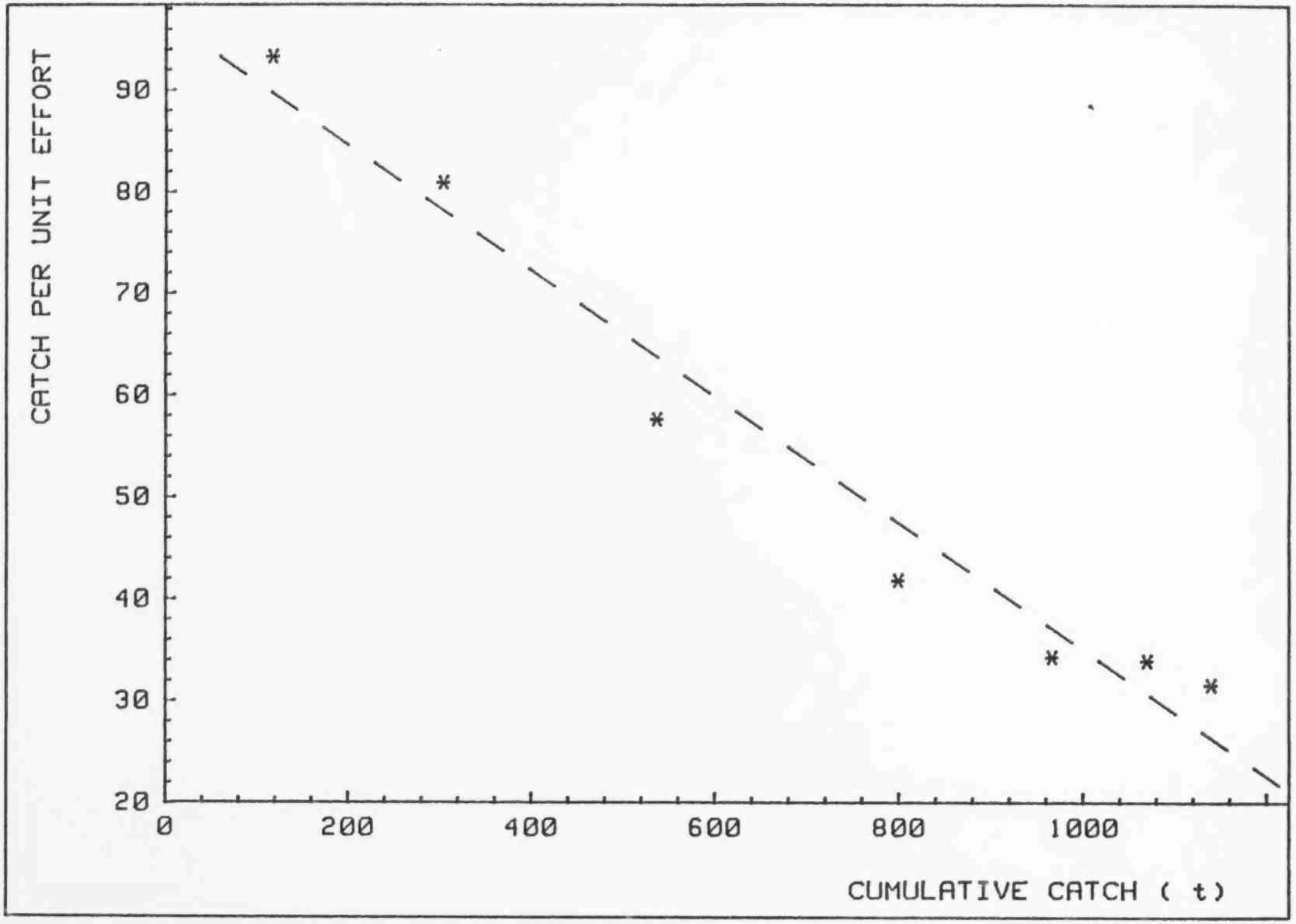

Figure 5. Leslie's analysis of catch and effort data for the first 7 weeks of fishing for area 1.

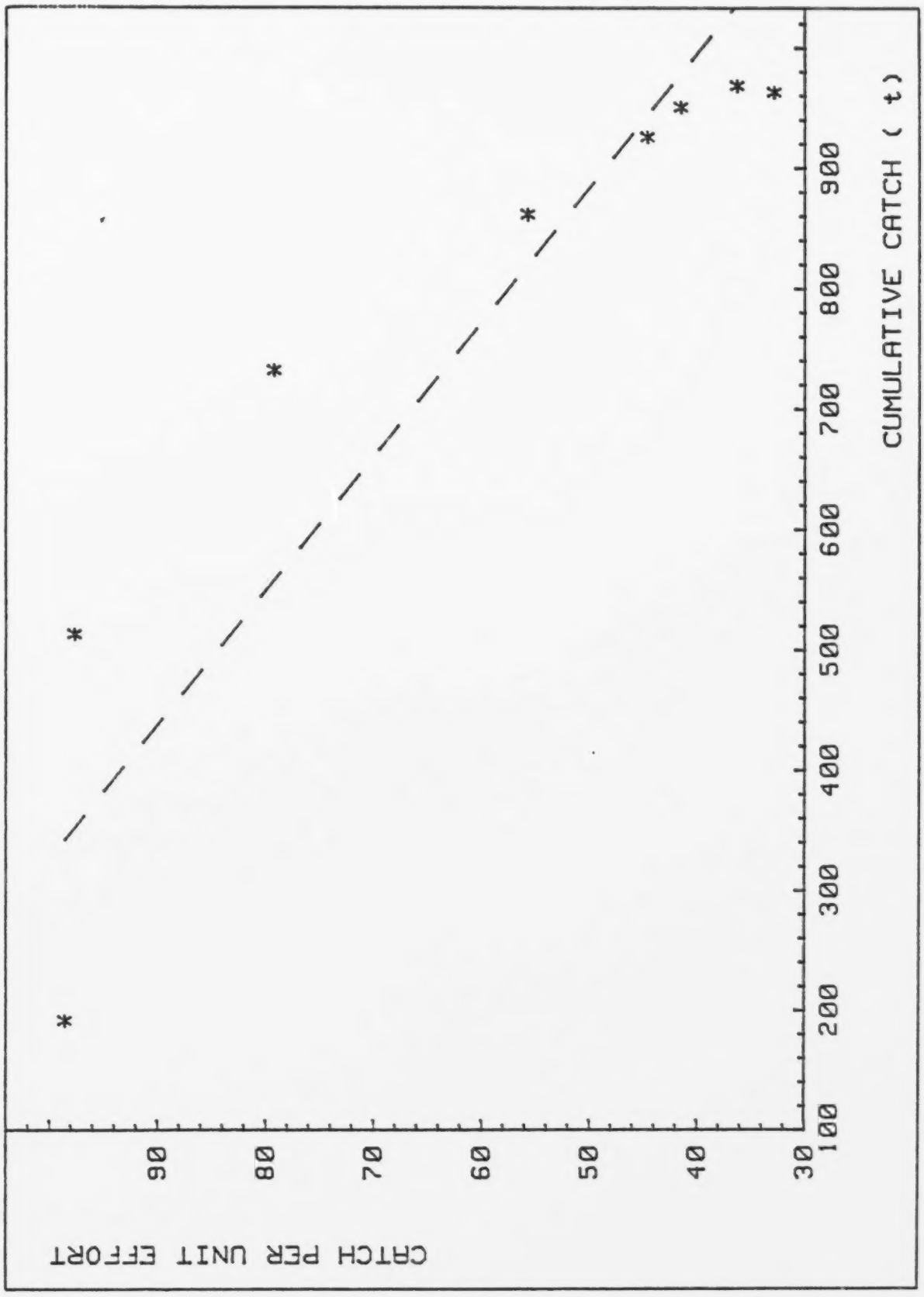

Figure 6. Leslie's analysis of catch and effort data from area 1 in 1983.

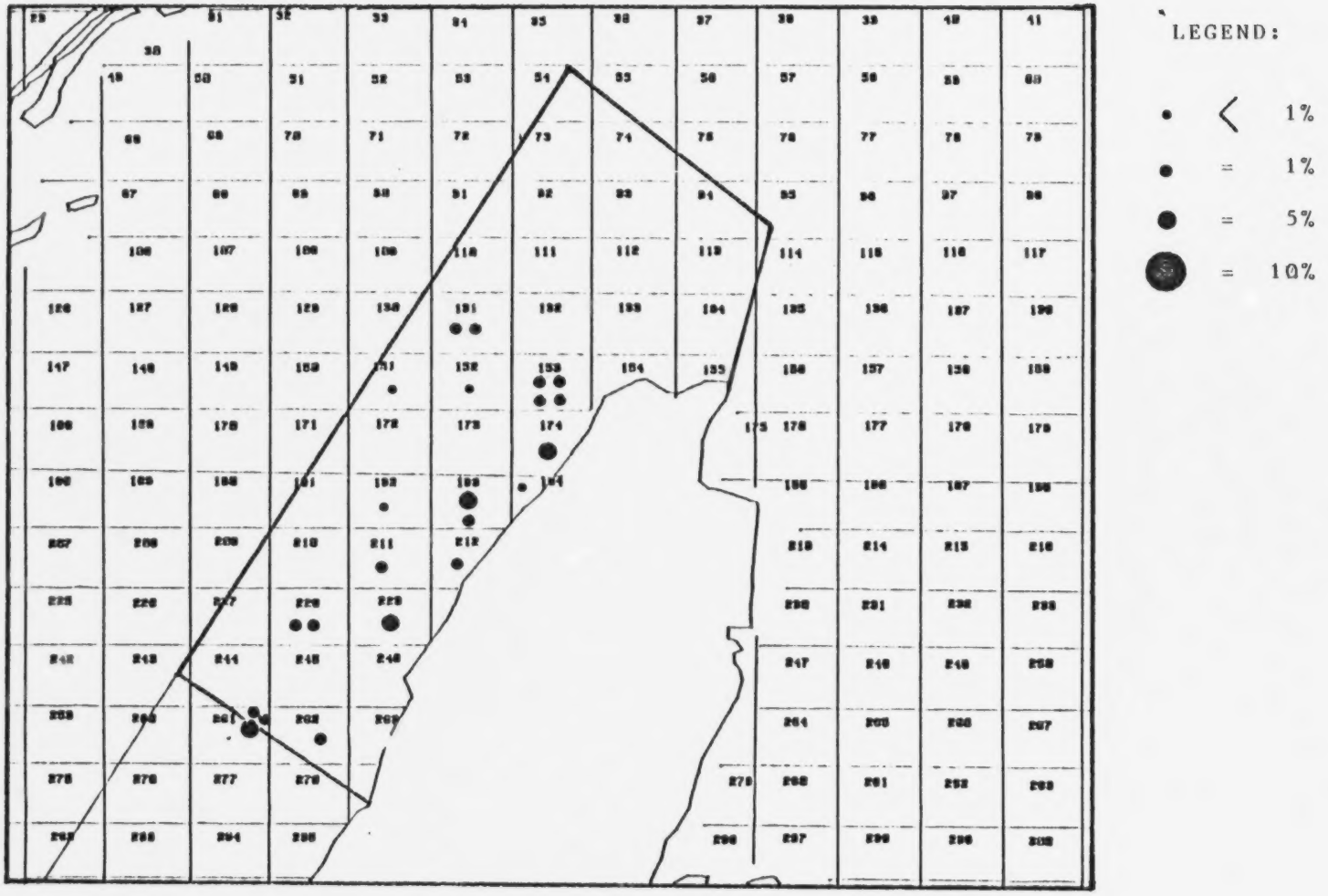

Figure 7. Distribution of fishing effort (% of trap haul) in area 1 for the 1983 fishing season.

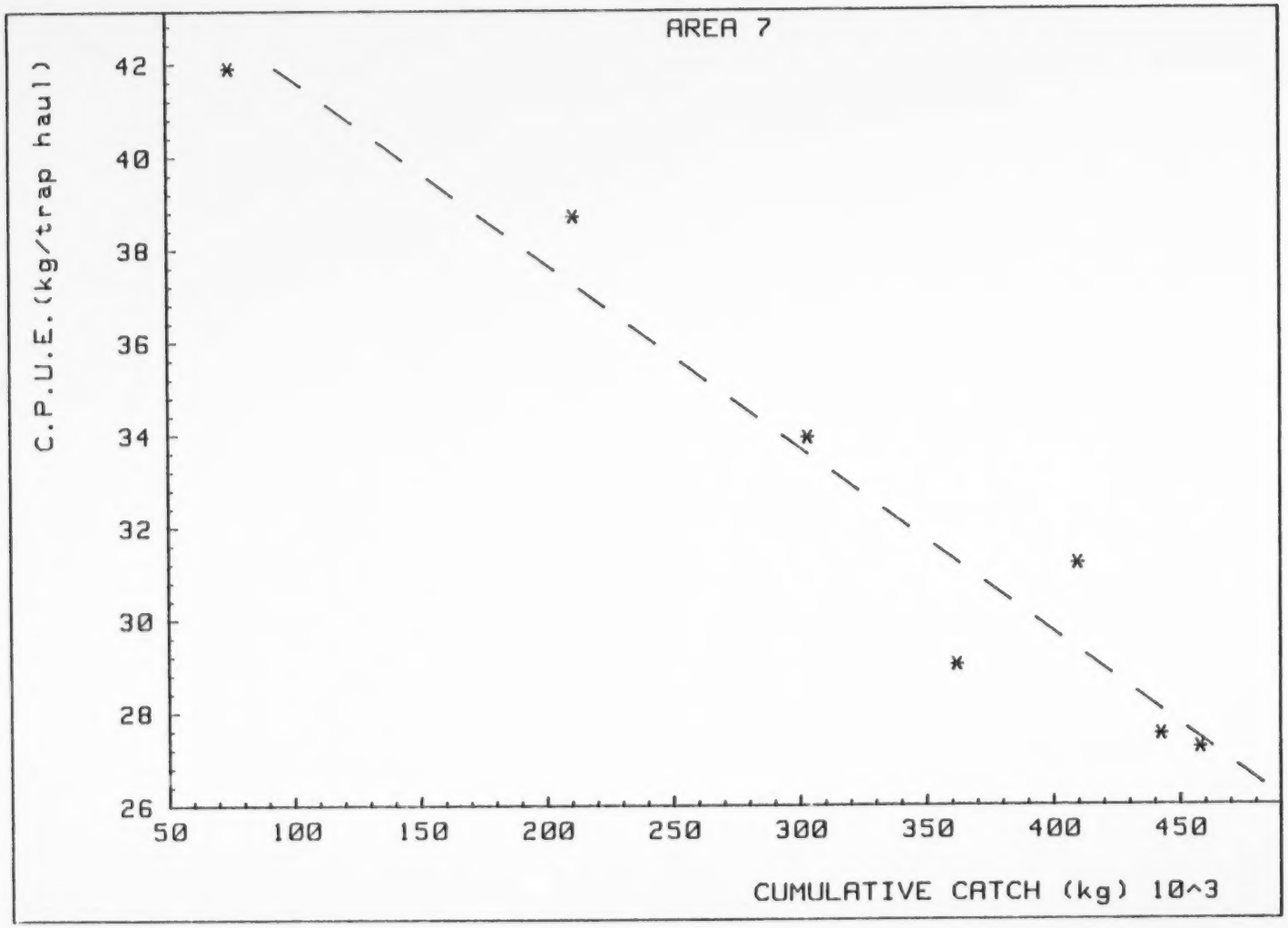

Figure 8. Leslie's analysis of catch and effort data from area 7 in 1984.